

**[0012]** Some embodiments of the disclosure may provide one or more technical advantages. For example, certain embodiments may reduce energy consumption by sharing radio unit hardware among cell sectors of a network node. Specifically, one or more radio units under reduced or no load conditions may be shared with other cell sectors in the same network node. In certain embodiments, MIMO and CDD configurations may be dynamically tuned. For example, a network node may be dynamically switched from a MIMO configuration to a SISO or SIMO configuration based on user load and current quality of service requirements.

**[0013]** Another technical advantage may be that operational expenses may be significantly reduced through energy saving and resource sharing. In certain embodiments, low load and no load cell sectors may be identified for resource sharing to reduce energy consumption. In certain embodiments, the Self Organizing Network (SON) Energy Saving function may be optimized to enable resource sharing based on active cell load while maintaining the same radio coverage with no compromise on live traffic capacity.

**[0014]** Another technical advantage may be that the determination that resource sharing should be implemented may be made based on the loading of the cell sectors in combination with user-defined thresholds. Additionally, the SON algorithm may be optimized to optionally check for PCI confusion and/or prevent maximum limits for cell neighbors from being exceeded prior to enabling radio unit sharing. If any such confusion exists or if maximum limits are exceeded, the radio unit services may not be shared.

**[0015]** Still another technical advantage may be that basic radio coverage may be provided with reduced radio throughput capacity. Energy consumption by multiple radio units may be optimized when radio unit capacity is no longer needed. Each cell sector within a network node may alternate between normal operating mode and a resource sharing/energy saving modes based on instantaneous demand. However, still another technical advantage may be that deactivated radio units may be reactivated as needed based on cell sector load.

**[0016]** Still another technical advantage may be that shared resources can be used to restore coverage loss where radio unit hardware can be lent or otherwise donated when a radio unit fails. In certain embodiments, the MIMO switching decision may be made by the optimized SON algorithm to avoid single point failure in the case of a faulty radio unit. As a result, sector coverage may not be lost and faulty equipment can be replaced during off-peak hours. Another technical advantage may be that operating a radio unit in a resource sharing mode may increase cell availability and reduce power consumption if the radio unit is also operating in a load balancing mode.

**[0017]** Some embodiments may benefit from some, none, or all of these advantages. Other technical advantages may be readily ascertained by one of ordinary skill in the art.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** For a more complete understanding of the present invention and its features and advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

**[0019]** FIG. 1 is a block diagram illustrating an example of a network in which power consumption may be reduced according to certain embodiments;

**[0020]** FIG. 2 is a block diagram illustrating an example network node configured to reduce power consumption according to certain embodiments;

**[0021]** FIG. 3 is a switch diagram illustrating an example radio unit array configured for operation in a normal mode according to certain embodiments;

**[0022]** FIG. 4 is a switch diagram illustrating an example radio unit array configured for operation in a resource sharing mode according to certain embodiments;

**[0023]** FIG. 5 is a flow chart illustrating an example embodiment of a method for providing resource sharing for addressing radio unit failure according to certain embodiments;

**[0024]** FIG. 6 is a flow chart illustrating an example alternative embodiment of a method for reducing power consumption by sharing resources in a network node;

**[0025]** FIG. 7 is a switch diagram illustrating an alternative example radio unit array configured for operation in a resource sharing mode according to certain embodiments;

**[0026]** FIG. 8 is a switch diagram illustrating still another alternative example embodiment enabling the sharing of resources in a network node;

**[0027]** FIG. 9 is a flow chart illustrating an example embodiment of a combined method for providing resource sharing and reducing power consumption in no load or low load conditions or in response to device failure;

**[0028]** FIG. 10 is a block diagram illustrating embodiments of a wireless device; and

**[0029]** FIG. 11 is a block diagram illustrating embodiments of a core network node.

#### DETAILED DESCRIPTION

**[0030]** Particular embodiments of the present disclosure may provide solutions enabling the sharing of resources in a network node to reduce power consumption by the network node. Certain embodiments may include functionality for detecting failure of a radio unit and reconfiguring an operational radio unit to provide coverage for the failing radio unit. Certain embodiments may additionally or alternatively include functionality for disabling a multi-input multi-output or cyclic delay diversity configuration in an operational radio unit so that the radio unit can provide service coverage for a failing radio unit. Certain embodiments may additionally or alternatively include functionality for determining when a radio unit is underutilized and reconfiguring the radio unit to provide service coverage for at least one other radio unit. Certain embodiments may additionally or alternatively include functionality for determining that a radio unit is in a low load condition and transfer service coverage from the low load radio unit to another radio unit that is able to accommodate the traffic associated with it and the low load radio unit. In each embodiment, at least one radio unit may be disabled to provide energy savings and reduced operating expenses.

**[0031]** Particular embodiments are described in FIGS. 1-11 of the drawings, like numerals being used for like and corresponding parts of the various drawings. FIG. 1 is a block diagram illustrating an example of a network 100 in which power consumption may be reduced according to certain embodiments. Network 100 includes one or more wireless communication devices 110, a plurality of network nodes 115, radio network controller 120, and a packet core network 130. In the example, wireless communication device 110a communicates with network node 115a over a wireless interface. For example, wireless communication device 110a